WHAT IS CLAIMED IS:

1. An optical pickup apparatus for recording or reproducing of information of one of a plurality of optical disks, including a first optical disk and a second optical disk, in a shared manner, the plurality of optical disks having transparent substrates different in thickness, comprising:

a plurality of light sources, including at least first and second light sources, which selectively emit one of a plurality of light beams, the plurality of light beams being different in wavelength, the wavelengths of first and second light beams, emitted by the first and second light sources, being appropriate for accessing the first and second optical disks respectively;

a coupling lens which converts a corresponding one of the plurality of light beams selectively emitted by the plurality of light sources, into a collimated beam;

an objective lens which forms a light spot on a corresponding one of the plurality of optical disks by focusing the collimated beam;

a holographic optical element which receives a reflection beam of the light spot from the corresponding one of the plurality of optical disks, and provides holographic effects on the reflection beam so as to diffract the reflection beam in predetermined diffracting directions depending on the wavelength of the reflection beam; and

a photodetector which receives the reflection beam from the holographic optical element at light receiving areas of the photodetector, and outputs signals indicative of respective intensities of the received reflection beam at the light receiving areas, so that a focusing error signal and a tracking error signal are generated based on the signals output by the photodetector.

2. The optical pickup apparatus according to claim 1, wherein the photodetector includes a set of first light receiving areas and a set of second light receiving areas which are separately provided for the first and second light beams having the different wavelengths, and wherein the holographic optical element

is configured such that the reflection beam is diffracted to only the first light receiving areas of the photodetector when the reflection beam has the wavelength of the first light beam, and the reflection beam is diffracted to only the second light receiving areas of the photodetector when the reflection beam has the wavelength of the second light beam.

3. The optical pickup apparatus according to claim 1, wherein the photodetector includes a set of common light receiving areas which is provided in common for the first and second light beams having the different wavelengths, and wherein the holographic optical element is configured with a first hologram and a second hologram, such that the reflection beam is diffracted at the first hologram to the common light receiving areas of the photodetector when the reflection beam has the wavelength of the first light beam, and the reflection beam is diffracted at the second hologram to the common light receiving areas of the photodetector when the reflection beam has the wavelength of the second light beam.

4. The optical pickup apparatus according to claim 1, wherein the first light source emits a first laser beam with a first wavelength appropriate for accessing the first optical disk, and the second light source emits a second laser beam with a second wavelength appropriate for accessing the second optical disk.

5. The optical pickup apparatus according to claim 4, wherein the photodetector and the holographic optical element are configured so as to satisfy the following requirements:

$$W \leq 2D\,[\tan\{\sin^{-1}(L1/d2)\} - \tan\{\sin^{-1}(L1/d1)\}]$$

$$W \leq 2D\,[\tan\{\sin^{-1}(L2/d2)\} - \tan\{\sin^{-1}(L2/d1)\}]$$

where L1 is the first wavelength of the first laser beam, L2 is the second wavelength of the second laser beam, d1 is a grating pitch of a first hologram of the holographic optical element, d2 is a grating pitch of a second hologram of the holographic optical element, W is a width of the light receiving areas of the photodetector, and D is a distance between the holographic optical element and the photodetector.

6. The optical pickup apparatus according to claim 1, wherein the optical pickup apparatus has a common optical path for the first and second light beams, and the coupling lens and the objective lens are arranged such that both an optical axis of the coupling lens and an optical axis of the objective lens accord with the common optical path.

7. The optical pickup apparatus according to claim 6, wherein the objective lens is a single element which is provided in common for the first and second light beams emitted by the first and second light sources.

8. The optical pickup apparatus according to claim 6, wherein the holographic optical element is arranged on the common optical path.

9. The optical pickup apparatus according to claim 8, wherein the holographic optical element is configured with a polarization hologram and a quarter-wave plate, the polarization hologram having diffracting effects depending on polarizing directions of the reflection beam, and the quarter-wave plate being arranged on the common optical path such that the quarter-wave plate is placed on an optical-disk side of the polarization hologram.

10. The optical pickup apparatus according to claim 6, wherein the coupling lens is arranged on the common optical path such that the coupling lens is placed adjacent to the first and second light sources.

11. The optical pickup apparatus according to claim 6, further comprising a beam splitter which is arranged on the common optical path adjacent to the first and second light sources and allows the first and second

light beams from the first and second light sources to be collected to the coupling lens along the common optical path.

12. The optical pickup apparatus according to claim 6, wherein the first and second light sources are arranged in a vicinity of the common optical path, and the first and second light sources, the photodetector and the holographic optical element are accommodated in a common package.

13. The optical pickup apparatus according to claim 11, wherein the holographic optical element is arranged on the common optical path, and the beam splitter, the first and second light sources, the holographic optical element and the photodetector are accommodated in a common module.

14. The optical pickup apparatus according to claim 12, wherein the holographic optical element is arranged on the common optical path, and the first and second light sources, the photodetector and the holographic optical element are integrated into the common package.

15. The optical pickup apparatus according to claim 9, wherein the polarization hologram includes:

a transparent substrate;

a birefringence layer of a polymer material provided on the transparent substrate in a periodic grating pattern, the birefringence layer having different refractive indexes for two orthogonal polarizing directions of the reflection beam; and

an isotropic overcoat layer provided to enclose the birefringence layer therein,

the polarization hologram diffracting the reflection beam in the predetermined diffracting directions depending on the wavelength of the incident reflection beam.

16. The optical pickup apparatus according to claim 15, wherein the birefringence layer of the polarization hologram is made of a stretched organic polymer film.

17. The optical pickup apparatus according to claim 15, wherein the birefringence layer of the polarization hologram is configured with a stretched organic polymer film, and the organic polymer material of the birefringence layer being selected from among polycarbonate, polyvinylalcohol, polymethylmethacrylate, polystyrene, polysulfone, polyethylsulfone, and polyimide.

18. The optical pickup apparatus according to claim 15, wherein the birefringence layer of the polarization hologram is configured with a heated and stretched polyimide film.

19. The optical pickup apparatus according to claim 15, wherein the polarization hologram is configured to substantially satisfy the following requirements

$$(np - n1)h = mL$$

$$(ns - n1)h = (m \pm 1/2)L$$

where np is a refractive index of the birefringence layer for a p-polarized light of the reflection beam, ns is a refractive index of the birefringence layer for an s-polarized light of the reflection beam, n1 is a refractive index of the isotropic overcoat layer, h is a depth of the periodic grating pattern, L is a wavelength of the reflection beam, and m is an integer (m = 0, ±1, ±2, •••).

20. The optical pickup apparatus according to claim 15, wherein the polarization hologram is configured to substantially satisfy the following requirements

$$(np - n1)h = (m \pm 1/2)L$$

$$(ns - n1)h = mL$$

where np is a refractive index of the birefringence layer for a p-polarized light of the reflection beam, ns is a

refractive index of the birefringence layer for an s-polarized light of the reflection beam, n1 is a refractive index of the isotropic overcoat layer, h is a depth of the periodic grating pattern, L is a wavelength of the reflection beam, and m is an integer (m = 0, ±1, ±2, ···).